

KHATSELEVICH, M.N., inzh.; FAYNGOL'D, I.Ya., inzh.; BOROVSHIY, G.N.,  
kand.tekhn.nauk; KLEMOV, N.N., inzh.

Replies to the inquiries of our readers. Elek. i tepl. tiaga  
5 no.5:43 My '61. (MIRA 14:7)

(Railroads--Signaling)

(Diesel locomotives--Maintenance and repair)

KLYKOV, Yevgeniy Vladimirovich, kand. tekhn.nauk; KAZARINOV, V.M.,  
prof., retsentsent; BOROVSKIY, G.M., kand. tekhn. nauk, red.;  
SOBAKIN, V.V., inzh., red.; KHITROVA, N.A., tekhn. red.

[Braking of trains]Tormozhenie poezda. Moskva, Transzheldorizdat,  
1962. 139 p. (MIRA 16:1)  
(Railroads--Brakes)

BOROVSKIY, G.M., kand. tekhn. nauk; KUZ'MINA, Ye.I., kand. tekhn. nauk;  
GORN, V.N., inzh.

Design of the diaphragms of braking equipment. Vest. TSNII  
MPS 23 no.8:33-36 '64 (MIRA 18:2)

BOROVSKI~~Y~~, G.S.

BOROVSKII, G.S. Steam-boilers in industrial enterprises Moskva, Gos.  
energ. izd-vo, 1949. 335 p. (49-54262)

TJ289.B57.

BOROVSKIY, I. B.

Y Borovskii, I. B., and Blokhin, M. A. X-RAY EXAMINATION OF THE METAMICT STATE OF ZIRCONS. *Trav. Inst. Lomonossov geokhim. i krist. mineral.*, 1936 [7] 197-204 (in English 206). — Investigation of zircons by the Debye and Laue methods disclosed that some were in the metamict state. In one case this state was characterized by the presence of a half-destroyed skeleton of the zircon lattice filled with  $ZrO_2$  and  $SiO_2$ , which explains the reappearance of  $ZrSiO_4$  upon calcining. In others this state was characterized by the presence of  $ZrSiO_4$  nearly totally decomposed into oxides of an extremely dispersed state. The density of zircons varies with the degree of disintegration into oxides. An attempt to produce an artificial metamict state of zircon was unsuccessful.

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BAGROVSKIY, I. D.																									
Analysis of minerals by the x-ray spectroscopic method I. D. Bagrovskiy and M. A. Blokhin. <i>Bull. Acad. Sci. U.S.S.R. Div. Chem. Sci., Earth Planet. Sci. Sect.</i> 1957, 1020-1024. <i>Mineralog. Abstracts</i> 7, 215. This method applied to various Zr and Ta silicates shows the presence in zircons of U, Th, Sr and Th, and in eudialytes of Y, Sr and Ta. C. A. Silbertud																									
METALLURGICAL LITERATURE CLASSIFICATION																									

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X-Ray spectrum analysis of elements. J. H. Rongyuan (Rev. Lab., 1938, 7, 184-189).—Known methods are discussed. R. T.

ASTM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

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Processes and Properties Index

Methods of x-ray spectroscopy. I. N. Borovskii  
Trudy Vsesoyuz. Konferentsii Anal. Khim., Akad. Nauk  
S. S. S. R. 1, 135-42 (1939); Khim. Referat. Zhur. 1940,  
No. 2, 67; cf. C. A. 33, 7101<sup>1</sup>; 35, 2089<sup>1</sup>.—X-ray spectral  
analyses were accelerated considerably by the use of  
light spectrographs with curved crystals according to the  
method of Cauchois and Johann (C. A. 26, 1510; 28,  
2654<sup>1</sup>). Rapid methods for detecting elements from 20 Cu  
to 47 Ag and from 71 La to 92 U and for the rare earth  
elements were developed. Detns. are carried out accord-  
ing to the method of equalization of the intensities, and  
methods for detg. Hf, Cb, Ta, Zn, Se, Th, U, Ce, La, Nd,  
Y and Mn were developed. The detns. differ by from  
5 to 20% from the true value. The sensitivity of the  
method is 0.1-0.01 at. %.

W. R. Henn

ASB-51A METALLURGICAL LITERATURE CLASSIFICATION

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1st and 2nd ORDER

PROCESSES AND PROPERTIES INDEX

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**X-rays—spectroscopic qualitative and quantitative analysis of the rare elements.** I. B. Borovskii, M. A. Blokhin and L. A. Grzhihovskaya. *Bull. acad. sci. U. R. S. S., Ser. phys. & math. sci.* 4, 123-4 (1940); cf. C. A. 35, 474. Various ores and minerals were analyzed for the rare elements with the x-ray spectrograph and with a bent crystal (Cauchols-Johann method, C. A. 26, 1510; 28, 2094). For the specially prep'd. mixts. of pure elements (standards) the relation between the intensity of lines and the concns. of Mn, Cr, Sr, Y, Zr, Nb, Mo, Ce, La, Pr, Nd, Ta, W, Pb, Th and U was found. Rokhsana Gamow

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

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**X-ray analysis of the cerium group of rare earths. I. B. Maslovskii, M. A. Blokhin and L. A. Grzhibovskaya. Zvezdshtaya Lab. 9, 740-1 (1941).—Expts. with synthetic mixts. show that the rare earth elements of the Ce group can be detd. by x-ray spectra within 5-7% of the truth. B. Z. Kamich**

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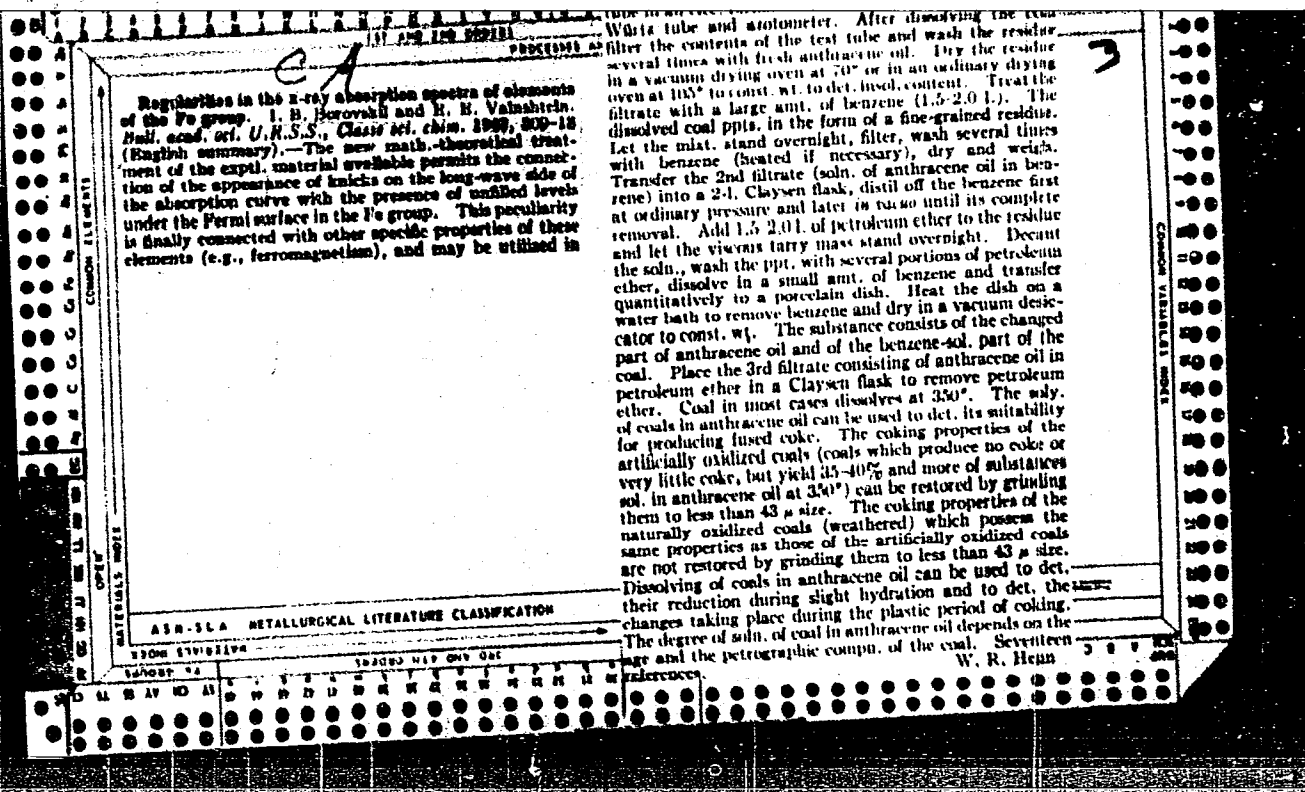
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

60. 260

**Effect of chemical bond on X-ray absorption spectra. K Main edge.** J. H. Hummel, *Compt. rend. Acad. Sci. U.S.S.R.*, 1940, 20, 764-769. The structure of the K edge has been investigated for elements 22 (Ti) to 26 (Mn). The multiplicity of the K main edge is particularly considered. The transition between the beginning of the edge and the first kink (the so-called white line) corresponds to a transition to a comparatively weakly excited discrete M level. A white line is present not only for elements of higher valency, but also for Mn, V, and Cr. The behaviour of the short boundary of the edge depends essentially on the crystal structure of the compound used. The intensity of white lines in the long-A part of the edge probably depends on the nature of the binding forces. When these are ionic the long-A white lines will be particularly sharp. The Kossel rule (A., 1923, 200), that the difference of terms for the main edge of cations and metallic elements is  $\propto$  valency, needs to be supplemented. The val. of a term for a metal should be that corresponding to the middle of the interval between the beginning of the edge and the first kink. Further corrections are given for cations giving an edge with a white line, and for those without a white line. A. J. M.

06-166

Influence of chemical binding on K X-ray absorption and emission spectra. I. P. Porovski (Bull. Acad. Sci. U.S.S.R., Ser. Phys., 1941, 4, 187-194). -- The structure of the main edge of K absorption bands and its relation to interatomic forces are discussed for various Ti, Zn, and Fe compounds.



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11. 11. 11

Absorption spectra of the iron group. I. B. Borovskii and E. E. Vainachtein (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, 88, 130—132).—Special attention is called to the influence of symmetry of the wave function of the initial state of transition  $\psi_i$  ( $KL_1 - 1s$ ;  $2s$ ;  $L_{2,3}m - 3p$ ) on the intensity of distribution in the fundamental edge and at a distance of 80 e.v. from it. Thus for  $W-L_1$  the edge has knicks on the long-wave regions without white lines on the short-wave side. For  $W-L_2, W-L_3$ ;  $Cu-L_2, Cu-L_3$ ;  $Ni-L_2$  simple fundamental edges with bright white lines on the short-wave side exist, which are lacking in  $^{60}Zn$  and  $^{197}Au$ . A new method of analysis leads to an identification of the short-wave max.  $(\nu/R)L_2L_3$  with the line  $(\nu/R)L_1$  of the  $L_1$  edges, and the inflexion lines are hence found to shift 6—8 e.v. For ionic compounds the max. of the absorption lines on the frequency scale is shifted only 1.8 to 1.2 e.v., but the shift of the  $(\nu_0/R)$  term reaches 7 e.v. for ions of max. valency.

J. O'M.B.

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<sup>I</sup>  
BOROVSKY, I. B.  
<sub>A</sub>

PA 4T97

USSR/Minerals - Identification  
Rare earths

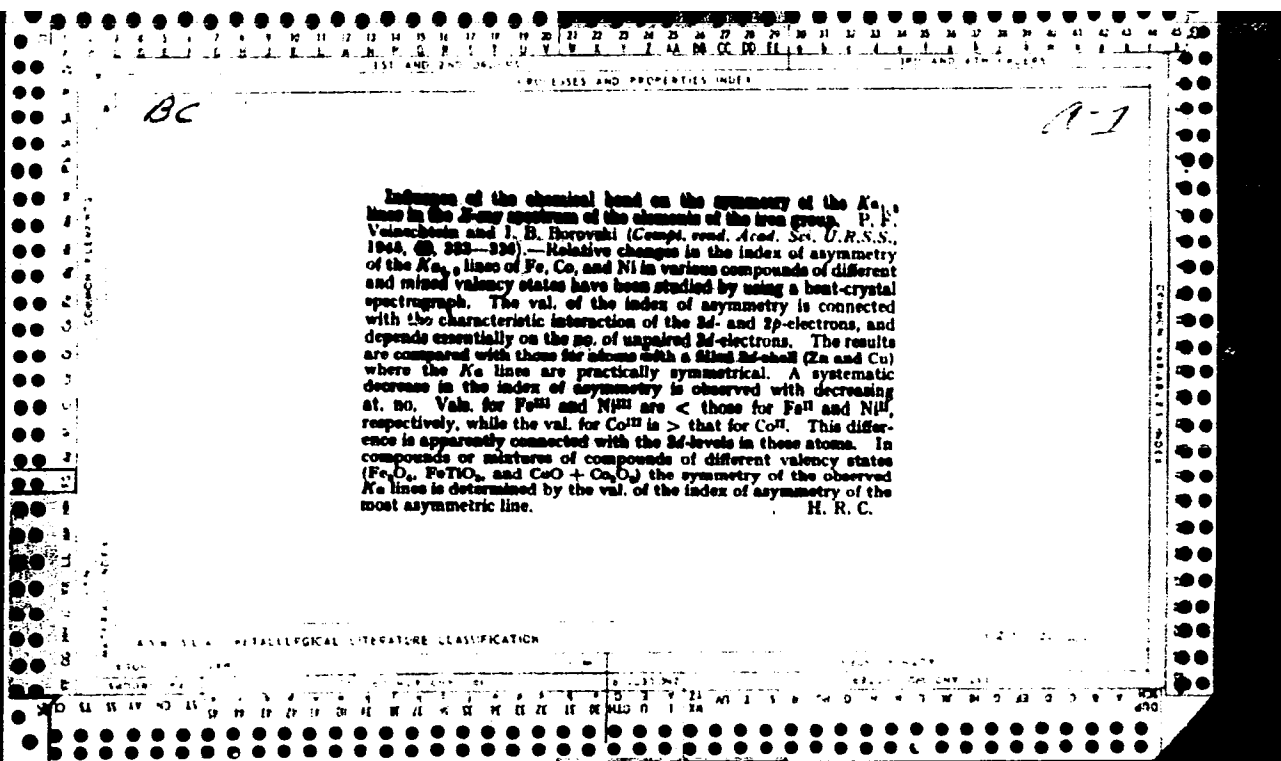
1945

"Rare Earths in Minerals," I. B. Borovsky and V. I.  
Gerasimovsky, 4 pp

"UR Acad Sci" Vol XLIX, No 5

Quantitative analyses, with X-ray spectroscopic  
methods, of rare earths present in minerals found in  
the Soviet Union

4T97



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

1ST AND 2ND GROUPS

PROCESSES AND PROPERTIES INDEX

THE ANALYTICAL INDEX

Investigations by X-Ray Spectroscopy. I. B. Rokoyak (Izved. Akad. Nauk S.S.S.R., 1946, [Pis.], 16, (4), 361-370).—[In Russian]. A review.  
—N. A.

COMMON ELEMENTS

COPY

NATURAL NO'S

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1950: 1951: 1952: 1953: 1954: 1955: 1956: 1957: 1958: 1959: 1960: 1961: 1962: 1963: 1964: 1965: 1966: 1967: 1968: 1969: 1970: 1971: 1972: 1973: 1974: 1975: 1976: 1977: 1978: 1979: 1980: 1981: 1982: 1983: 1984: 1985: 1986: 1987: 1988: 1989: 1990: 1991: 1992: 1993: 1994: 1995: 1996: 1997: 1998: 1999: 2000: 2001: 2002: 2003: 2004: 2005: 2006: 2007: 2008: 2009: 2010: 2011: 2012: 2013: 2014: 2015: 2016: 2017: 2018: 2019: 2020: 2021: 2022: 2023: 2024: 2025: 2026: 2027: 2028: 2029: 2030: 2031: 2032: 2033: 2034: 2035: 2036: 2037: 2038: 2039: 2040: 2041: 2042: 2043: 2044: 2045: 2046: 2047: 2048: 2049: 2050: 2051: 2052: 2053: 2054: 2055: 2056: 2057: 2058: 2059: 2060: 2061: 2062: 2063: 2064: 2065: 2066: 2067: 2068: 2069: 2070: 2071: 2072: 2073: 2074: 2075: 2076: 2077: 2078: 2079: 2080: 2081: 2082: 2083: 2084: 2085: 2086: 2087: 2088: 2089: 2090: 2091: 2092: 2093: 2094: 2095: 2096: 2097: 2098: 2099: 2100: 2101: 2102: 2103: 2104: 2105: 2106: 2107: 2108: 2109: 2110: 2111: 2112: 2113: 2114: 2115: 2116: 2117: 2118: 2119: 2120: 2121: 2122: 2123: 2124: 2125: 2126: 2127: 2128: 2129: 2130: 2131: 2132: 2133: 2134: 2135: 2136: 2137: 2138: 2139: 2140: 2141: 2142: 2143: 2144: 2145: 2146: 2147: 2148: 2149: 2150: 2151: 2152: 2153: 2154: 2155: 2156: 2157: 2158: 2159: 2160: 2161: 2162: 2163: 2164: 2165: 2166: 2167: 2168: 2169: 2170: 2171: 2172: 2173: 2174: 2175: 2176: 2177: 2178: 2179: 2180: 2181: 2182: 2183: 2184: 2185: 2186: 2187: 2188: 2189: 2190: 2191: 2192: 2193: 2194: 2195: 2196: 2197: 2198: 2199: 2200: 2201: 2202: 2203: 2204: 2205: 2206: 2207: 2208: 2209: 2210: 2211: 2212: 2213: 2214: 2215: 2216: 2217: 2218: 2219: 2220: 2221: 2222: 2223: 2224: 2225: 2226: 2227: 2228: 2229: 2230: 2231: 2232: 2233: 2234: 2235: 2236: 2237: 2238: 2239: 2240: 2241: 2242: 2243: 2244: 2245: 2246: 2247: 2248: 2249: 2250: 2251: 2252: 2253: 2254: 2255: 2256: 2257: 2258: 2259: 2260: 2261: 2262: 2263: 2264: 2265: 2266: 2267: 2268: 2269: 2270: 2271: 2272: 2273: 2274: 2275: 2276: 2277: 2278: 2279: 2280: 2281: 2282: 2283: 2284: 2285: 2286: 2287: 2288: 2289: 2290: 2291: 2292: 2293: 2294: 2295: 2296: 2297: 2298: 2299: 2300: 2301: 2302: 2303: 2304: 2305: 2306: 2307: 2308: 2309: 2310: 2311: 2312: 2313: 2314: 2315: 2316: 2317: 2318: 2319: 2320: 2321: 2322: 2323: 2324: 2325: 2326: 2327: 2328: 2329: 2330: 2331: 2332: 2333: 2334: 2335: 2336: 2337: 2338: 2339: 2340: 2341: 2342: 2343: 2344: 2345: 2346: 2347: 2348: 2349: 2350: 2351: 2352: 2353: 2354: 2355: 2356: 2357: 2358: 2359: 2360: 2361: 2362: 2363: 2364: 2365: 2366: 2367: 2368: 2369: 2370: 2371: 2372: 2373: 2374: 2375: 2376: 2377: 2378: 2379: 2380: 2381: 2382: 2383: 2384: 2385: 2386: 2387: 2388: 2389: 2390: 2391: 2392: 2393: 2394: 2395: 2396: 2397: 2398: 2399: 2400: 2401: 2402: 2403: 2404: 2405: 2406: 2407: 2408: 2409: 2410: 2411: 2412: 2413: 2414: 2415: 2416: 2417: 2418: 2419: 2420: 2421: 2422: 2423: 2424: 2425: 2426: 2427: 2428: 2429: 2430: 2431: 2432: 2433: 2434: 2435: 2436: 2437: 2438: 2439: 2440: 2441: 2442: 2443: 2444: 2445: 2446: 2447: 2448: 2449: 2450: 2451: 2452: 2453: 2454: 2455: 2456: 2457: 2458: 2459: 2460: 2461: 2462: 2463: 2464: 2465: 2466: 2467: 2468: 2469: 2470: 2471: 2472: 2473: 2474: 2475: 2476: 2477: 2478: 2479: 2480: 2481: 2482: 2483: 2484: 2485: 2486: 2487: 2488: 2489: 2490: 2491: 2492: 2493: 2494: 2495: 2496: 2497: 2498: 2499: 2500: 2501: 2502: 2503: 2504: 2505: 2506: 2507: 2508: 2509: 2510: 2511: 2512: 2513: 2514: 2515: 2516: 2517: 2518: 2519: 2520: 2521: 2522: 2523: 2524: 2525: 2526: 2527: 2528: 2529: 2530: 2531: 2532: 2533: 2534: 2535: 2536: 2537: 2538: 2539: 2540: 2541: 2542: 2543: 2544: 2545: 2546: 2547: 2548: 2549: 2550: 2551: 2552: 2553: 2554: 2555: 2556: 2557: 255

21

QUANTITATIVE X-RAY SPECTRAL ANALYSIS BY THE METHOD OF THE WIDTH OF STANDARD LINE. I.B. Borovskii. (Izvestiya Laboratoriya, 1948, vol 14, Nov., pp 1335-1343). (in Russian). A review of methods of quantitative spectrum analysis is followed by an account of a technique for use with X-rays, both theoretical and practical aspects of the latter being discussed.—S.K.

158-51A METALLURGICAL LITERATURE CLASSIFICATION

**New method of quantitative x-ray spectral analysis**  
**L. B. Dergachev, Doklady Akad. Nauk S.S.S.R. 59, 20-21**  
 (1948). The new method, termed the "method of the width of the standard line," the amt.  $p$  of the unknown element  $B$  is detd. from the width  $w'$  of a "standard" line of another element  $A$  at the height of the peak of the line of  $B$ . In the particular case of greatly different contents of  $A$  and  $B$ , the simplified formula  $p = q \ln \{[(w/w')^2 + 1]/(w/c)^2\}$  is applicable, with  $c$  = natural half-width,  $q$  = const. If the intensity of the line of  $A$  is considerably lower than that of  $B$ , the unknown amt. of  $B$  can be detd. from the width  $w'$  of  $B$  at the height of the peak of  $A$ , by the formula  $w' = c \sqrt{\{1 - (c^{2q})/k\} - 1}$ , where  $q$  and  $k$  are const. The relation between  $p$  and  $w$  is independent of the exposure within a 3-4-fold variation of its length and of the treatment of the photographic plate. It is not necessary to have nearly equal amt. of  $A$  and  $B$ . The probable error lies within 2 and 3%. S. Thom

BOROVSKIY, I. B.

PA 165T97

USSR/Physics - Spectra, Absorption  
Fine Structure

1 May 50

"Investigation of the Fine Structure of Absorption Spectra," I. B. Borovskiy, R. L. Barinskiy, Inst of Geol Sci, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXII, No 1, pp 31-34

Results of this study show convincingly that reliable data for absorption and emission spectra (for purpose of clarifying distribution of free and captured electrons in the levels) can be obtained only for study of spectra in different series (K, L, M, N). Submitted 9 Mar 50 by Acad S. I. Vavilov.

165T97

BOROVSKIY, I. B.

PA 175T86

USSR/Physics - Crystals  
New Techniques

21 May 50

"New Method of Bending Crystals Used in Roentgeno-Spectral Investigations, Into Spectrographs With Curved Crystals," I. B. Borovskiy, Inst Geol Sci, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXII, No 3, pp 485-487

Describes method and instr employed in bending crystals ("crystal-holders") used in X-ray studies. Submitted 13 Feb 50 by Acad S. I. Vavilov.

175T86

1ST AND 2ND GROUPS																										3RD AND 4TH GROUPS																									
COMMON ELEMENTS																										COMMON ELEMENTS																									
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<p>7059</p> <p><b>FINE STRUCTURE OF THE X-RAY ABSORPTION SPECTRA OF CERTAIN ELEMENTS.</b> I. B. Borovskii and R. L. Barinskii. <i>Izvest. Akad. Nauk S.S.S.R. Ser. Fiz.</i> 15, No. 2, 225-30(1951) Mar.-Apr. (In Russian)</p> <p>Experimental absorption coefficients measured near the <math>L_{\alpha}</math>, <math>M_{\alpha}</math>, and <math>M_{\beta}</math> absorption edges of <math>UO_2</math> and <math>UO_3</math> are plotted, and the observed fine structure is related to electronic configurations.</p>																																																			
<p>ASH-SLA METALLURGICAL LITERATURE CLASSIFICATION</p>																																																			
<p>1ST AND 2ND GROUPS</p>																																																			

BOROVSKIY, I. B.

USSR/Physics - X-Ray Absorption

1 Sep 51

"Concerning Ruled (Measured) Absorption of X-Rays,"  
I. B. Borovskiy, V. I. Rydrik, Moscow State U imeni  
Lomonosov

"Dok Ak Nauk SSSR" Vol IXXX, No 1, pp 41-44

Attempts a further generalization of the law governing the ruled (measured) absorption of X-rays for the purpose of clarifying the peculiarities of the electron structure of atoms of elements belonging to the transitional groups, for example, elements 42 Mo and 62 Sm. Submitted 28 Jun 51 by Acad A. A. Lebedev.

221T83

4

611

X-ray spectral, chemical microanalysis at separate points in a polished section. I. B. Borovskii. *Problemy Met. Moscow: Izdatel. Akad. Nauk. S.S.S.R.* 1953, 135-5; *Referat. Zhur., Fiz.* 1955, No. 5813. An analysis is made of the principal systems in existing x-ray spectrographs with a curved crystal. The variants which are possible in using curved crystals for increasing the intensity of the diffracted monochromatic emission are obtained by geometric construction. Attention is given to the possibility of making effective use of an "inverse" method, by which the source point of the x-rays is placed on the focal surface of the curved crystal (Rowland's circle), and the diffracted pencil of monochromatic rays passes through the crystal and is registered, for example, by an electronic multiplying machine. A metallographic polished section, at the points where x-ray chem. analysis can be made is used as the anode of the source point of x-rays. The focal point must not measure more than 50  $\mu$ , and 5  $\mu$  is better. Marjorie Kettner

Stud  
CIR 1954

BOROVSKIY, I.B.

Application of X-ray spectrum analysis. Izv.AN SSSR Ser.fiz. 17 no.2:163-169 '53. (MLWA 6:8)

1. Institut metallurgii imeni A.A.Baykova Akademii nauk SSSR.  
(X-rays--Industrial applications) (Spectrum analysis)

PA 249111

BOROVSKIY, I. B.

USSR/Physics - X-ray Emission

11 Jan 53

"Multiplet Nature in the Spectra of X-ray Emission,"  
I. B. Borovskiy and T. M. Golovner, Phys Faculty,  
Moscow State

DAN SSSR, Vol 88, No 2, pp 233-6

The purpose of the present article is to detn the  
possible no of components of the complex x-ray  
multiplet  $M_{a1}$ ,  $M_{a2}$ ,  $M_{b1}$  on the basis of original  
exptl data and computations. Presented by Acad  
A. A. Lebedev 14 Nov 52.

249T17

BOROVSKIY, Ya. B.

B. T. R.  
Vol. 3 No. 4  
Apr. 1954  
Physics

5623 Diffraction of X-Rays in Bent Crystals, Kinematic Theory for the Case of Transmission and Reflection. J. B. Borovsky and P. A. Bezirganyan. *National Science Foundation Translation*, no. 55-56, Aug. 1953, 8 p. (Original in *Doklady Akademii Nauk SSSR*, v. 88, 1953, p. 630-642, 769-772.) Reports results developed on basis of kinematic theory of X-ray interference for general case of a three-dimensional bent crystal. Graphs. 3 ref.

4/29/54

The paper shows average originality. Ingenuity, thoroughness, and reliability seem superior. BOROVSKIY has published since 1948, but BEZIRGANYAN appears to be a new name in the literature (Chem. Abstracts).

BOROVSKIY, I.B.

"Deffraction of X-rays on Bent Crystals. Kinetic Theory - The Case of Reflection."  
DAN SSSR, vol. 88, no.5, pp 769-772, 11 Feb 1953

Refer to their previous (DAN SSSR, 88, no.4 (1953)) construction of a kinetic theory of X-ray diffraction for the case of passage through, which corresponds to the disposition of the source of radiation on the convex side of the bent crystal, but the conditions for max. interference are for radiaitin that has passed through the crystal. In the present work the authors construct a similar soln., but for the case of reflection, where the source of radiaitons and interference maxima are disposed on one concave side of the bent crystal.. Obtain an expression for the wave reflected from a three-dimensional curved drystal. Presented by Acad A.A. Lebedev  
14 Nov 52

258T110

WOROVSKIY, I. V.

2689

DIFFRACTION OF X-RAYS IN BENT CRYSTALS  
INTEGRAL INTENSITY OF REFLECTION FOR THE  
TRANSMISSION METHOD. I. B. Borovskii [Borovsky] and  
P. A. Bezirganyan. Translated from Doklady Akad. Nauk  
S.S.S.R. 93, 1125-32(1953). 5p. (NSF-41-226)

The integral of intensity of reflection was determined for a strongly divergent beam of x rays by a bent crystal. Theoretical results are compared with experimental. The integral intensity of reflection from a bent crystal several cm in size along an arc was found to be approximately  $10^4$  times higher than the integral intensity of reflection from a plane crystal. (C.N.)

USSR/Physics - X-ray spectra

Card 1/1 : Pub. 146-18/18

Author : Kostarev, A. I., and Borovskiy, I. B.

Title : Discussion. Theory of Roentgen absorption spectra

Periodical : Zhur. eksp. i teor. fiz., 26, 377-384, May 1954

Abstract : The authors discuss the theory of the fine structure of Roentgen absorption spectra of various substances. They give a survey of the literature on this theory, especially of the works of E. Ye. Vaynshteyn, R. L. Barinskiy, and K. I. Narbutt, writing in Doklady Akademii Nauk SSSR for 1951-1952. In particular the two authors consider the applicability of the Rydberg series formula, the relation between theories of the main edge and the peak of the Roentgen absorption band, and finally the Roentgen spectra of ionic crystals. Thirty-two references, 19 USSR.

Institution : Odessa State University and Institute of Metallurgy, Acad. Sci. USSR

Submitted : August 19, 1953

BOROVSKIY, I.B.; BEZIRGANYAN, P.A.

X-ray diffraction by bent crystals. Nauch.trudy Erev.un. 48 no.2:  
79-91 '55. (X-ray crystallography) (MIRA 9:9)

BOROVSKY, I. B.

Borovsky, I. B., Il'in, N. P., "A New Method of Roentgen-Spectral Research (study) of the Chemical Composition in the Micro-Volume of an Alloy."

in book Research on Heat Resistant Alloys, pub by Acad. Sci. USSR, Moscow, 1956, 160 pp.

Inst. Metallurgy im A. A. Baykov

~~BOROVSKIY, Igor' Borisovich; GUROV, K.P., redaktor; NOSYREVA, I.A.,~~  
~~redaktor izdatel'stva; MULIN, Ye.V., tekhnicheskiy redaktor~~

[Physical foundations of x-ray research] Fizicheskie osnovy  
rentgenospektral'nykh issledovaniy. [Moskva] Izd-vo Moskovskogo  
univ., 1956. 462 p. (MIRA 9:8)  
(X rays)

*Borovskiy, I.B.*

K-8

USER/Optics - X-Rays

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 13150

Author : Borovskiy, I.B., Il'in, N.P.

Inst :  
Title : New Method for X-ray Spectral Investigation of the Chemical Composition in a Microvolume of Alloy.

Orig Pub : Issledovaniya po zharoprochnune splavam. M., AN SSSR, 1956, 25-32

Abstract : A method has been developed that makes possible quantitative analysis of the chemical composition of a substance in volumes on the order of 10 cubic microns. In a setup proposed by the authors, it is possible to make an analysis for elements from 26 Fe to 42 Mo and from 72 Hf to 92 U. The source of radiation is a micro-focus X-ray tube, operating at 30 -- 50 kv and 0.1 -- 1.0 microamperes. The electron beam, obtained from a corresponding EM-4 electro-nograph apparatus, is focused on the investigated polished

Card 1/3

K-8

USSR/Optics - X-Rays

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 13150

section. The use of rather large specific loads became possible, for at very small dimensions of the focusing spot (3 microns), the radial heat transfer begins to play a substantial role. This has insured a sufficient radiation intensity. The polished section can be moved in its own plane, making it possible to analyze any point on it under observation in a metallographic microscope, mounted in the setup. The analysis is by means of a short-wave spectrograph with a quartz crystal, bent in a radius of 300 mm, using reflection from the (1010) or (1340) planes. The transmission method, described by Du Mond is used, and gives a gain in intensity by 2 -- 3 orders of magnitude over the direct method. The spectrum is registered by a Geiger type counter RM-4 whose rate of count can be determined simultaneously with the scaling instrument PS-64 and from the direct-reading meter of the integrating circuit. In addition, the intensity of the spectrum can be written

Card 2/3

USSR/Optics - X-Rays

K-8

Abs Jour : Ref Zhur - Fizika, No 5, 1957, 13150

by an automatic recording electronic potentiometer, type  
EPP-09. This setup makes it possible to carry out a quan-  
titative analysis with an accuracy to 2 -- 5% at a sensiti-  
vity of  $10^{-13}$  grams.

Card 3/3

*BOROVSKIY, I.B.*  
Category : USSR/Optics - X Rays

K-8

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 5275

Author : Borovskiy, I.B., Il'in, N.P.  
Inst : Institute of Metallurgy, Academy of Sciences USSR  
Title : New Methods for the Investigation of the Chemical Composition in the  
Micro-Volume of an Alloy.

Orig Pub : Dokl. AN SSSR, 1956, 106, No 4, 655-657

Abstract : A new method was developed for investigating the chemical composition on a polished section. An electron beam, focused by magnetic lenses, excites characteristic x-rays in a volume of the section approximately 10 cubic microns in size. The tube voltage is 30-50 kv, the current reaches 1 microampere. The load on the polished section anode is on the average 1 kw/mm<sup>2</sup>. The intensity is recorded with the aid of the unit of the URS-50-I apparatus to record the intensity curve. To plot the spectrum at a given "point" on the polished section one employs the reverse method with transmitted radiation. The motion of the tube is synchronized with the motion of the counter. The instrument permits also to plot the curve of the variation of the intensity of a given line over the polished section, for a fixed position of the tube

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Category : USSR/Optics - X Rays

K-8

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 5275

and counter, by displacing the specimen. Curves are given for the intensity distributions of the  $NiK\alpha_1$  and  $WLa_2$  lines over the points of the multi-component alloy. The analysis of the chemical composition at the "point" can be carried out with a sensitivity of 0.1%, corresponding to  $10^{-13}$  grams of the element at the "point." The relative accuracy of the quantitative determinations is 2 -- 5%.

Card : 2/2

137-58-6-13152

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 281 (USSR)

AUTHORS: Borovskiy, I.B., Miller, Yu.G., Shcherbakov, A.P.

TITLE: Self-diffusion in  $\alpha$ -Fe (Samodiffuziya v  $\alpha$ -Fe)

PERIODICAL: V sb.: Issled. po zharoprochn. splavam. Vol 2, Moscow, AN SSSR, 1957, pp 228-233

ABSTRACT: To determine small values of the coefficient of diffusion D (of the order of  $10^{-12}$  -  $10^{-13}$  cm<sup>2</sup>/sec) the method of consecutive removal of layers in conjunction with extended diffusion annealing (up to 40 days at 700°C) is used. Isotope Fe<sup>59</sup> was applied electrolytically onto an Fe specimen of 15-mm diam and 5-mm thickness. Electrolytic Fe served as the subject for the investigation. After annealing, several specimens were glued with salol onto a holding disc and were then polished simultaneously with powder. The thickness of each removed layer was determined to within  $\pm 5\mu$ . Also used was the anodic dissolving method, i.e., by means of taking electrolytic "prints" on filter paper moistened with an aqueous 15% NaCl solution. At 60 ma the duration of the dissolution was 2 min. The mean square error in measuring the activity of the "prints" by a

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137-58-6-13152

Self-diffusion in  $\alpha$  Fe

$\beta$ -ray counter was 1.5%. Values for D were compared at 1100°C upon removing layers off a given specimen, measuring the integral  $\gamma$  activity, taking imprints, and measuring the  $\beta$  activity. Results for the first method:  $D = 4.3 \cdot 10^{-10}$  with a 25% error; for the second method:  $D = 4.8 \cdot 10^{-10} \text{ cm}^2/\text{sec}$  with a 3% error. Self-diffusion was studied in the range of 705-900°. At 705-745° the presence of boundary diffusion was noted. For volumetric self-diffusion  $D \approx 3.2 \exp(-56500/RT) \text{ cm}^2/\text{sec}$ . Increasing Cr content to 1.5% raises Q and  $D_0$ , whereas a further increase in Cr to 15% brings about a decrease of Q and  $D_0$  down to the values characteristic for pure Fe. Alloying with up to 0.12% Mo lowers D. Increasing Mo up to 6% increases Q monotonously.

I.D.

1. Iron--Diffusion
  2. Diffusion--Test results
  3. Iron isotopes ( Radioactive)
- Applications

Card 2/2

SOV/137-58-7-15571

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 7, p 235 (USSR)

AUTHORS: Borovskiy, I. B., Gurov, K. P.

TITLE: On the Problem of the Role of Small Substitutional Admixtures in Alloys [K voprosu o roli malykh primesey zameshcheniya v splavakh (I)]

PERIODICAL: V sb.: Issled. po zharoprochn. splavam. Vol 2. Moscow, AN SSSR, 1957, pp 234-245

ABSTRACT: In order to explain the effect of small substitutional admixtures (A) on the physical properties of transition metals a qualitative theory of the formation of short-range order ("blocks") in the crystalline lattice of the base under the influence of excess charges of the atoms of the A was developed. Three premises are laid as its base: 1) the excess charge of the substitutional A causes a deformation of the electron spectrum in the metal, especially of the conductivity zone and, consequently, effects also a spatial redistribution of the density of conductivity electrons (E); 2) the E of the conductivity zone are free, therefore the Thomas-Fermi approximation is valid; 3) the adiabatic concept is valid because in the presence

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SOV/137-58-7-15571

On the Problem of the Role of Small Substitutional Admixtures in Alloys

of a small A the lattice period undergoes only insignificant transformations. First, using the Thomas-Fermi method, the deformation of the spectrum of the conductivity E, the redistribution of the density of E, and the screening of the potential of the excess charge of A in the presence of one atom of A in an entire crystal are calculated. The distance  $R_0$  at which the screening can be considered to be practically complete has the order of the lattice period. Next, the E of the incomplete shell of transition metals is examined. The level zone of these E overlaps the conductivity zone, so that the deformation of the levels examined above concerns both zones. A comparative portion of screening E in each zone is proportional to the density of the levels at the Fermi level in the respective zone. At the same time each atomic frame situated closer than  $R_0$  receives an additional negative bound charge. Such atomic frames interact with the excess charge of A (a "block" forms with dimensions  $\sim R_0$ , inside which the mobility of the atoms is impeded). The results obtained extend to the case of the final concentration of A. At the same time A is considered to be distributed uniformly, a crystal is broken into cells in the center of which an atom of A is situated. For this case, the solution is given by a somewhat different  $R_0$  which depends rather sharply on the concentration of the A, c (in atom %);  $R_0 \approx (c)^{1/3}$ . The optimum concentration of A is determined by the following considerations: it is

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"On the Problem of the Role of Small Substitutional Admixtures in Alloys

necessary for the majority of the atoms of the base to be in "blocks", but the potentials of A should not overlap, because in that case a long-range order is formed. Thus  $1/[\sigma 4\pi/3(2R_0)^3] \leq C < 1/[\sigma 4\pi/3(R_0)^3]$  where  $\sigma$  is the density of the nodes of the crystalline lattice. The insufficient strictness of the theoretical investigation consists of the fact that the Thomas-Fermi method which is applicable to free E with an energy close to the Fermi level, is applied to the E of an incomplete shell.

G.L.

1. Alloys--Physical properties
2. Alloys--Transformations
3. Alloys--Lattices

Card 3/3

SOV/137-58-9-19672

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 9, p 211 (USSR)

AUTHORS: Borovskiy, I.B., Ditsman, S.A., Baturev, V.A.

TITLE: On the Problem of the Role of Small Amounts of Substitution  
Admixtures in Alloys [ K voprosu o roli malykh primesey  
zameshcheniya v splavakh (II) ]

PERIODICAL: V sb.: Issled. po zharoprochn. splavam. Vol 2. Moscow, AN  
SSSR, 1957, pp 246-250

ABSTRACT: The effect of admixtures on the electron energy spectrum of  
Cr (of various degrees of purity), Mo, and Cr in Cr-Mo alloys  
was investigated. X-ray spectra of iodide Cr (99.97%), electro-  
lytic Cr (99.80-99.85%), hydride Cr (99.5%), and Mo (99.1%)  
were studied. Absorption and emission spectra of Cr were  
obtained on a spectrograph according to Johann in the second  
order of reflection from a quartz crystal bent along a radius of  
500 mm, using the reflection from the (1010) face. It is estab-  
lished that with a decrease in the contents of additives in Cr,  
the lines  $K\beta_1$  and  $K\beta_5$  are displaced in the short-wave sense  
and the index of asymmetry of the line of  $K\alpha_1$  is sharply modi-  
fied, but the absorption K-edge does not vary. With a

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SOV/137-58-9-19672

On the Problem of the Role of Small Amounts of Substitution (cont.)

variation in the content of Mo in alloys from 0.53 to 14 atom % the variation in the position of the  $K \beta_1$  and  $K \beta_5$  lines begins only with an Mo content of 12 atom %. The  $L_{111}$  -edge of Mo differs from the one described in literature. The conclusions are that, 1) small amounts of admixtures affect the electronic spectrum of Cr, 2) upon a change-over from iodide to hydride Cr, the boundary of the Fermi plane and the 3p band are displaced in the direction of lower energies, 3) a similar behavior of the Fermi boundary and the inner levels takes place in Cr-Mo alloys, but with an increase in the Mo content the relative variation of the electron spectrum is weaker than in the presence of small amounts of admixtures. For the preceding report see RZhMet, 1958, Nr 7, abstract 15571.

I.D.

1. Chromium--Spectrographic analysis    2. Chromium alloys--Spectrographic analysis

Card 2/2

137-58-5-10397

BOROVSKIY, I. B.

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 5, p 215 (USSR)

AUTHORS: Borovskiy, I. B., Ronami, G. N.

TITLE: Effect of Temperature on the Electronic Spectrum of Metals and Alloys (Vliyaniye temperatury na elektronnyy spektr metallov i splavov)

PERIODICAL: V sb.: Issled. po zharoprochn. splavam. Vol 2. Moscow, AN SSSR, 1957, pp 251-256

ABSTRACT: A study is made of changes with temperature in the energy spectrum of metals and alloys, using Pb (99.98% pure) and Pb-Sn, and alloys with 0.5 and 10% Sn as the test materials. The method was study of fine structure of the L<sub>III</sub> absorption and emission spectra in the 190-250°C interval. The absorption spectra were derived by means of a Cauchois spectroscope with a quartz crystal (2nd order plane [1010]), dispersion 4xE/mm). The best spectrum contrast was obtained when the thickness of the absorber was 12-14 microns. It was found that intensity and the number of fine structure fluctuations diminished as temperature rose. In addition, a clear change in the structure of the primary region itself was observed for Pb and Pb + 10 % Sn.

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137-58-5-10397

Effect of Temperature on the Electronic Spectrum of Metals and Alloys

in addition, a "fading" of the fine structure was observed on the shortwave side in the case of Pb+0.5% Sn, but the major region underwent no change as temperature rose. Except for some "blurring" of the first fluctuation with Pb and Pb+10% Sn, no shift in the wavelength of the individual elements of the fine structure was observed. It is hypothesized that the generally accepted assumption that the oscillation of atoms is to be regarded as a slight disturbance of the energy spectrum of the electrons in a crystal does not permit an understanding of the results obtained in this study. It is held that the electron-phonon interactions in metals and alloys not only have a significant effect on processes of scattering, but also change the distribution of energy states. Further hypotheses are required as far as the Pb+5% Sn alloy is concerned.

I. D.

1. Metals--Spectrum    2. Metals--Temperature factors    3. Spectroscopes  
--Applications

Card 2/2

*Borovskiy I.B.*

137-58-2-4432

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 305 (USSR)

AUTHORS: Borovskiy, I.B., Deyev, A.N., Il'in, N.P.

TITLE: Investigating the Chemical Composition of an Alloy Microvolume by X-ray Spectroscopy (Rentgeno-spektral'nyy metod issledovaniya khimicheskogo sostava v mikroob'yeme splava)

PERIODICAL: Tr. In-ta metallurgii AN SSSR, 1957, Nr 2, pp 181-187

ABSTRACT: A description is given of a special RSASh-2 X-ray machine which makes it possible to determine the chemical composition of an alloy on volumes of the order of magnitude of a few cubic microns for the elements ranging in atomic number from 26 (Fe) to 45 (Rh) and from 72 (Hf) to 92 (V). From the continuous travel of the alloy microsection under electron-beam bombardment and from the simultaneous recording being made of the intensity of the characteristic-spectrum line for the element under study it is possible to determine the element's distribution in the chosen direction on the microsection. The machine was used to study the diffusion layer of Cu-Zn.

M.N.

Card 1/1

1. ~~Alloys~~—Chemical properties    2. X-ray spectroscopy—~~Appli-~~  
cations

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**AUTHOR:** - Borovskiy, I.B. and Gurov, K.P.

**TITLE:** On the theory of solid solutions of transition metals. (K teorii tverdykh rastvorov na osnove perekhodnykh metallov)

**PERIODICAL:** "Fizika Metallov i Metallovedenie" (Physics of Metals and Metallurgy), 1957, Vol.IV, No.1 (10), pp.187-189 (U.S.S.R.)

**ABSTRACT:** On the basis of published and to be published results by the authors of this paper, relating to the study of the electron energy spectrum of solid solutions and the mobility of atoms in solid solutions, it was established that small concentrations have an important influence on the properties, and this influence has characteristic features in cases in which a transition element metal forms the basic component of the solid solution. The results can be summarised thus: an appreciable change is observed in the wave length and the shape of the K- and L- absorption wedges, the  $K_{\beta 2}$  and  $K_{\beta 5}$  lines of emission of the X-ray spectrum of transition elements in the solid solutions. The highest effect is achieved in the case of concentration of admixtures below 0.8 at.% and the effect ceases for concentrations of 2 at.% and above. A noticeable "thawing" of the fine structure of the absorption edge is observed for lead with increasing temperature; at 200 °C the entire fine structure practically ceases to exist, however, in the case of a 0.5 at.% of tin content the fine

On the theory of solid solutions based on transition element<sup>131</sup>  
metals, (Cont.)

structure of the absorption boundary of the lead remains conserved at 200 °C. On increasing the tin concentration this effect ceases and the results will again be obtained which are characteristic for pure lead. The curve of the coefficient of self-diffusion of  $\alpha$ -iron has two minima and two maxima and then changes into an asymptotic curve which is characteristic for transition metals; the curves are analogous also for other transition metals. These experimental observations and also analysis of data given in the literature led the authors to developing a conception on the formation of "blocks" inside solid solutions with a low content of one of the components. The theoretical results thus deduced may play an important role in the physical theory of alloying, and a detailed description of the experimental data and their interpretation in accordance with the conceptions developed by the authors will be the subject of later papers. 6 references, 5 of which are Russian.

Institute of Metallurgy  
imeni A.A. Baykov.

Recd, October 30, 1956.

48-10-2/20

*Borovskiy, I. B.*  
AUTHOR: None given

TITLE: Materials of the 2nd All-Union Conference on X-ray Spectroscopy; Moscow, January 31 to February 4, 1957 (Materialy II Vsesoyuznogo soveshchaniya po rentgenovskoy spektroskopii; Moskva, 31 yanvarya - 4 fevralya 1957 g.)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1957, Vol 21, Nr 10, pp 1341 - 1342 (USSR)

ABSTRACT: The Second All-Union Conference on X-ray Spectroscopy was held from January 31 to February 4, 1957. Thirty-three reports were given, 18 of which appear in this issue. The remaining are: Introductory Remarks by Ya. S. Umanskiy; Calculating the Structure of X-ray Emission Spectra of Self-Regulating Alloys by A. N. Orlov and A. V. Sokolov (UFAN SSSR); Contemporary Methods of X-ray Spectra Registration by M. A. Blokhin and A. I. Froyman (RGU and Khimfak MGU); High Stability lower Sources for X-ray Spectra Installations by A. I. Froyman; Prospective Applications of Electrostatic Photography (xerography) in X-ray Spectral and X-ray Structural Analysis by A. I. Froyman; Investigation of the Fine Structure of X-ray K-Spectra of Absorption and Emission of Some Elements of the Iron Group by I. B. Borovskiy, V. P. Bykov and

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48-10-2/20

Materials of the 2nd All-Union Conference on X-ray Spectroscopy; Moscow, January 31, to February 4, 1957

A. I. Kozlenkov (Fizfak MGU); Interrelationship of Some X-ray Spectral and Magnetic Characteristics of Iron-Base Alloys by S. A. Nemmonov and K. M. Kolabova (UFAN SSSR); Investigation of Binding Forces in Solid Iron-Molybdenum Solutions According to the Fine Structures of X-ray Absorption Spectra by V. A. Trapeznikov and S. A. Nemmonov (UFAN SSSR); On the Theory of Solid Solutions Based on Transitional Metals by I. B. Borovskiy and K. P. Gurov (IMET AN SSSR); Relationship of Temperature and Concentration of Fine Structure of X-ray Absorption Spectra of Solids and an Investigation of Binding Forces by V. A. Trapeznikov; Investigation of X-ray L-Spectra of Some Rare-earth Element Compounds by N. V. Troneva, I. D. Marchukova and I. B. Borovskiy (Fizfak MGU); Investigation of X-ray Emission K Lines of  $\beta$ -Group Titanium in Carbides and Some Other Compounds by E. Ye. Vaynshteyn and Yu. N. Vasil'yev (GEORNI AN SSSR); X-ray Spectral Investigation of Molybdenum L Spectra in Some Alloys and Compounds by V. A. Batyrev, I. B. Borovskiy and S. A. Ditsman (IMET AN SSSR); Some Satellites of Spectral Lines by T. I. Kakushadze (Georgian Teacher's Institute); X-ray Spectral Investigation of Sulphur-containing Samples by M. A. Blokhin, P. S. Nesterenko and A. T. Shuvayev (RGU).

AVAILABLE: Library of Congress  
Card 2/2

*Borovskiy, I.B.*  
**AUTHOR:** Borovskiy, I.B., Ronami, G.N.

48-1010/20

**TITLE:** The Influence Exercised by Heat Oscillations in Atoms Upon the Energetical Electron Spectrum of Metals and Alloys (Vliyaniye teplovykh kolebaniy atomov na elektronnyy energeticheskiy spektr metallov i splavov)

**PERIODICAL:** Izvestiya AN SSSR Seriya Fizicheskaya, 1957, Vol. 21, Nr 10, pp.1397-1400 (USSR)

**ABSTRACT:** On the basis of the tests carried out the following may be said:  
1.) Apart from the well-known fact of the "melting" of the fine structure on the shortwave side, a structural change and a change of the basic absorption edge itself takes place, proceeding from the basic absorption edge, with an increase of metal temperature. Thus the modification of the frequency and of the amplitude of atomic oscillations influences not only the processes of dispersion, but also the entire energetic spectrum of the metal-crystal lattice.  
2.) The intensity of "melting" of the fine structure in the absorption spectrum and of the structure of the basic edge of the absorption of lead in lead alloys at an increase of temperature depends in a high degree on the percentage of the content of the "alloy" element. Thus, the presence of "small" admixtures (up to 1%) con-

Card 1/2

48-10-10/20

The Influence Exercised by Heat Oscillations in Atoms Upon the Energetical  
Electron Spectrum of Metals and Alloys

siderably modifies the frequency and the amplitudes of atomic  
oscillations with an increase of temperature (compared to these  
amounts for pure metal). There are 2 figures, 1 table, and  
7 references, 6 of which are Slavic.

ASSOCIATION: Faculty of Physics, Moscow State University imeni M.V.Lomonosov  
(Fizicheskiy fakultet Moskovskogo gosudarstvennogo universiteta  
im. M.V.Lomonosova)

AVAILABLE: Library of Congress

Card 2/2

48-10-11/20

*Borovskiy, I.B.*

AUTHOR:

Borovskiy, I.B., Gurov, K.P., Ditsman, S.A.,  
Batyrev, V.A., Lobanova, N.D.

TITLE:

X-Ray Spectral Investigations of Solid Solutions (Rentgeno-  
spektral'nyye issledovaniya tverdykh rastvorov)

PERIODICAL:

Izvestiya AN SSSR Seriya Fizicheskaya, 1957, Vol. 21, Nr 10,  
pp. 1401-1411 (USSR)

ABSTRACT:

On the basis of experimental investigations and the theoretical analysis of the problem of diluted solid solutions the authors draw the following conclusions: 1.) In diluted solid solutions near the admixture atoms with a negative excess charge "atomic blocks" are formed with an effective radius of  $10^{-7}$  cm (if the atoms of the basis are atoms of the elements of transition groups). Within the boundaries of these blocks an additional play of forces develops (cut off) potential. 2.) The influence exercised by these "blocks" in an energetical electron spectrum manifests itself most in-so-far as there is no interaction between the admixture atoms. 3.) The additional binding which develops and which is of polar character, is conserved within the limits of a large interval of concentration modification for solid solutions of the

*Borovskiy, I.B.*

**AUTHOR:** Borovskiy, I.B., Shmidt, V.V.

48-10-12/20

**TITLE:** The Application of the URS-50-I X-Ray Unit as a Double Crystal Spectrometer (Ispol'zovaniye rentgenovskoy ustanovki URS-50-I (IPC-50-I) v rezhime dvoynogo kristallspektrometra)

**PERIODICAL:** Izvestiya AN SSSR Seriya Fizicheskaya, 1957, Vol. 21, Nr 10, pp. 1412-1414 (USSR)

**ABSTRACT:** Until recently no double crystal spectrometer existed in the USSR. After the construction of the URS-50-I unit it was perfected by the authors, so that it became possible to use it as a double crystal spectrometer. The essential bases of a two-crystal spectrometer are here described in short. Satisfactory functioning of the URS-50-I unit as a two-crystal spectrometer can be attained only by very careful adjustment. The latter consists mainly in the following: 1.) The rotation axis of the B crystal must coincide with its plane of reflection. 2.) The axis of the B crystal must coincide with the plane which is parallel to the reflecting plane of the A crystal. A special theoretical investigation of the accuracy of recordings of the two-crystal spectrometer and of the influence exercised by adjustments upon accuracy was carried out. According to W.W.Beeman and H. Friedman (Phys.Rev. 56, 392, 1939) it is

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48-10-12/20

The Application of the URS-50-I X-Ray Unit as a Double Crystal Spectrometer

necessary in absorption spectrum registration that at every point of the spectrum intensity be measured twice: once with and once without the absorber. Besides, a special device, by which the absorber is always returned to the same place, must be provided. This method was improved by the authors by the introduction of an additional control counter. Besides, it is proved that the entire spectrum can be recorded by means of a constantly fixed absorber. In this manner the time of recording was considerably shortened. There are 5 figures and 6 references, 2 of which are Slavic.

**ASSOCIATION:** Laboratory for Methods of Physical Research at the Metallurgical Institute imeni A.A.Baykov AS USSR (Laboratoriya fizicheskikh metodov issledovaniya instituta metallurgii im. A.A.Baykova Akademii nauk SSSR)

**AVAILABLE:** Library of Congress

Card 2/2

*Borovskiy, I.B.*

**AUTHOR:** Borovskiy, I.B., Il'in, N.P., Loseva, L.Ye., 48-10-13/20  
Marchukova, I.D., Deyev, A.N.

**TITLE:** X-Ray Spectral Investigations of the Chemical Composition in Microvolumes of Alloys (Rentgenospektral'nyye issledovaniya khimicheskogo sostava v mikroob'yemakh splavov)

**PERIODICAL:** Izvestiya AN SSSR Seriya Fizicheskaya, 1957, Vol.21, Nr 10, pp.1415-1423 (USSR)

**ABSTRACT:** The method described here was at the same time developed by Kasten in France (since 1951) and also in the USSR. The characteristic feature of the method is the following: The metallographical micro-section surface to be investigated is inserted into the special X-ray tube instead of the anode. The anode "mirror" is the ground surface the microstructure of which can be observed in the metal microscope which is mounted in the tube. By means of microscrews the sample can be displaced in the anode plane. At the Institute for Metallurgy the RSASh-2 unit, an X-ray spectrograph for the analysis of microsection surface elements of from Fe<sup>26</sup> to Mo<sup>42</sup> and from Hf<sup>72</sup> to U<sup>92</sup> was worked out. Besides, the model for the RSASh-2D unit is already completed, by means of which it is possible to investigate the elements from Fe<sup>26</sup> up to and including Mg<sup>12</sup>. The results

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X-Ray Spectral Investigations of the Chemical Composition in Microvolumes of Alloys 48-10-13/20

obtained by several investigations carried out by means of this device are discussed here. It is shown that the following problems can be solved quickly and reliably by means of this method: Analysis of the phase composition of complexly alloyed alloys, investigation of the degree of de-liguation in alloys, investigation of the order of distribution of alloy additions and their re-distribution during aging, deformation, heat treatment, investigation of diffusion- and other intermediate layers, of granular boundaries, and of the processes taking place in them. There are 6 figures and 2 tables.

ASSOCIATION: Laboratory for Methods of Physical Research at the Institute for Metallurgy imeni A.A.Baykov AS USSR (Laboratoriya fizicheskikh metodov issledovaniya instituta metallurgi im.A.A.Baykova AN SSSR)

AVAILABLE: Library of Congress

Card 2/2

BOROVSKIY I. B.

AUTHORS: Borovskiy, I. B., Professor, Doctor of Physical and Mathematical Sciences, Il'in, N. P., Candidate of Technical Sciences 32-10-25/32

TITLE: The Method of Radiospectroscopic Investigation of Local Chemical Composition (Rentgenospektral'nyy metod issledovaniya lokal'nogo khimicheskogo sostava)

PERIODICAL: Zavodskaya Laboratoriya, 1957, Vol 23, Nr 10, pp 1234-1242 (USSR)

ABSTRACT: In the introduction the development of this method is described the purpose of which, in its newest form, is to carry out radiospectral investigations with respect to the content of various elements at various points of the sample and / or in a row of successive points while the object table (together with the sample) is shifted uniformly under the electron beam. A certain line of the element to be investigated is automatically recorded on the diagram of the self-recording potentiometer, and possible modifications in the concentration of the element are on this occasion made apparent. By this method and with the help of the corresponding apparatus, the analyses of minerals, slags, and ores, which contain the elements of from magnesium (12) to uranium (92)

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The Method of Radiospectroscopic Investigation of Local  
Chemical Composition

32-10-25/32

are investigated. Two systems used for this purpose are described: "PCAUW-2" which is destined to be used for a range from 0.7 to 1.0 Å (corresponding to the atoms Nr 26-42 according to the k-series, and 72-92 according to the L-series), and the second system "PCAUW-3/A", which is destined to be used for the so-called "vacuum domain" of the X-ray spectrum (1.5 - 10 Å). The first system consists of the following parts: a microfocus X-ray tube, an X-ray spectrograph, a feeder block, and a recording block, which are described in detail. In the chapter "Analysis of uniformity" it is said that it is the aim of the method to determine the uniformity of the distribution of one of the elements without having to investigate the entire microstructure. In the chapter "Analysis of Phase Composition" an example of determining concentration in a nickel solution with microcomponents is described, into which rhenium was additionally introduced as a component. This resulted in the sorting out of a new phase which has a rich content of rhenium, tungsten, and molybdenum. In the chapter: "Analysis of welded or soldered Seams" it is said that, when copper is melted on to cold steel, a layer of 15-40μ is formed, which can

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be determined metallographically. When using the system "PCAW -2" it was possible for the first time to investigate the formation of this layer, which is connected with the separation of certain elements. In the chapter "Investigation of diffusion Layers" the diffusion properties of the metals are described on the basis of two samples: copper-nickel and copper-zinc. In the first case it was possible, by employing the radiospectral method, to find out that the components formed an uninterrupted series of solid solutions, on which occasion an uninterrupted modification of concentration was found to take place on the nickel line; in the second case two phases of constant composition were formed in the diffusion layer, and on the transition boundary to the pure metal a sudden decrease of the failing component was found to take place. In the conclusion it is said that the following problems can be solved by this method: The phase analysis of multicomponent alloys; the investigation of the degree of homogeneity of the solutions; investigation of the topographical distribution of the alloying admixtures and their transformation in the

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processes of aging, deformation, or thermal treatment;  
investigation of inter-layer formation due to diffusion  
or other causes. In conclusion the hope is expressed that  
this newly introduced method with a new apparatus may in  
future find new possibilities of being used.  
There are 8 figures, 1 table, and 3 references, 2 of which  
are Slavic.

ASSOCIATION: Institute of Metallurgy imeni A.A. Baykov of the Academy of Sciences, USSR  
(Institut metallurgii im. A. A. Baykova Akademii nauk SSSR)

AVAILABLE: Library of Congress

1. Minerals-Analysis 2. Polentiometers-Applications

Card 4/4

AUTHOR: Not given PA - 2883  
 TITLE: Prizes Amounting to 5.000.- Roubles Each Awarded by the President of  
 the Academy of Science of the U.S.S.R. - Department of Technical  
 Sciences. (Otdyeleniye tyekhnicheskikh nauk, Russian)  
 PERIODICAL: Vestnik Akademii Nauk,SSSR, 1957, Vol 27, Nr 2, pp 96-96 (U.S.S.R.)  
 Received: 5 / 1957 Reviewed: 7 / 1957

ABSTRACT: Prizes were given to:  
 (Jointly) I.B.BOROVSKIY, Dr.phys.math.sc. and 2 further collaborators  
 (Institute for Metallurgy "A.A.BAYKOV) for the work: "Radio-Spectral  
 Method of Investigating the Chemical Composition of Smelts in the  
 Molecular Domain".  
 (Jointly) I.V.KRAGYELSKIY, Dr.tech.sc. and 7 further collaborators  
 (Institute for Machine Construction) for the work: "Production of New  
 Friction Materials on the Basis of the Molecular-Technical Friction  
 Theory).  
A.A.BULGAKOV, cand.tech.sc. (Institute for Automation and Telemechanics"  
 for works within the field of the frequency control of asynchronous  
 motors.  
 (Jointly) N.I.PRIGOROVSKIY, Dr.tech.sc., and further 8 collaborators  
 (Institute for Machine Construction) for the work: " Measuring of  
 Power Output and Deformation in the Hydroturbine Wheel of the  
 Dnyeprov Hydroelectricity Plant".

Card 1/2

BOROVSKIY, Igor' Borisovich; SKOTNIKOV, Sergey Aleksandrovich;  
LYUSTIBERG, V.F., inzh., ved. red.; KHIMCHENKO, N.V.,  
kand. tekhn.nauk, red.; SOROKINA, T.M., takhn. red.

[Apparatus for the spectrum determination of gases in metal]  
Apparatura dlia spektral'nogo opredeleniia gazov v metallakh.  
Moskva, Filial Vses. in-ta nauchn. i tekhn. informatsii,  
1958. 22 p. (Peredovoi nauchno-tekhnicheskii i proizvodstven-  
nyi opyt. Tema 33. No.P-58-86/3) (MIRA 16:3)  
(Gases in metals) (Spectrum analysis)

BOROVSKY, I. B.

24(7)

PHASE I BOOK EXPLOITATION

L'bor. Universitet

807/1700

Materials of the 10th All-Union Conference (Cont.)  
 1. II. Atomnaya spektroskopiya (Materials of the 10th All-Union Conference on Spectroscopy, 1956. Vol. 2: Atomic Spectroscopy) (Izvy. Iid-vo L'vorskogo univ. 1958. 568 p. (Series: Ite: Nizhelskiy sbornik, vyp. 4(9)) 3,000 copies printed.

Additional Sponsoring Agency: Akademiya nauk SSSR. Komissiya po spektroskopii.

Editorial Board: G.S. Landsberg, Academician, (Resp. Ed.); I.A. Pribludnyy, Doctor of Physical and Mathematical Sciences; V.A. Fabrikant, Doctor of Physical and Mathematical Sciences; V.G. Koritskiy, Candidate of Technical Sciences; S.M. Krayevskiy, Candidate of Physical and Mathematical Sciences; L.K. Klimovskaya, (Deceased), Doctor of Physical and Mathematical Sciences; V.S. Milyanchuk, Candidate of Physical and Mathematical Sciences; A.Ye. Glazman, Doctor of Physical and Mathematical Sciences; M.I. S.L. Gaser, Tech. Ed.; T.V. Saranyuk.

Foreword: This book is intended for scientists and researchers in the field of spectroscopy, as well as for technical personnel using spectrum analysis in various industries.

Contents: This volume contains 177 scientific and technical studies of atomic spectroscopy presented at the 10th All-Union Conference on Spectroscopy. The studies were carried out by members of scientific and technical institutions and include extensive bibliographies of Soviet and other countries. The studies cover many phases of spectroscopy: spectra of rare earths, electromagnetic radiation, physicochemical methods for controlling uranium production, physics and technology of gas discharges, optics and spectroscopy, abnormal dispersion in metal vapors, spectroscopy and the combustion theory, spectrum analysis of ores and minerals, photographic methods for quantitative spectrum analysis of metals and alloys, spectral determination of the hydrogen content of metals by means of isotopes, tables, and statistical study of variation in the parameters of calibration curves determined in traces of metals, spectrum analysis in metallurgy, thermochromism in metallurgy, and principles and practice of spectrochemical analysis.

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Materials of the 10th All-Union Conference (Cont.)	807/1700
Zaydel', A.M., A.A. Petrov, and K.I. Petrov. Spectral Determination of Hydrogen in Metals by the Isotope Balance Method	206
Burgast, V.A., G.V. Veynberg, A.M. Zaydel', and A.A. Petrov. Isotopic Spectrum Analysis of Hydrogen-deuteron Mixtures	207
Sventitskiy, N.S., and K.I. Tuganov. Studies on the Spectral Determination of Hydrogen in Metals	209
Vidro, G.I., B.D. Lufi, and Yu. V. Matorin. Use of Gas-discharge Devices as Light Sources in the Spectrum Analysis of Inert Gases	212
Bochkova, O.P., and L.P. Matimovskaya. Spectrum Analysis of Multicomponent Gas Mixtures	214
Borovskiy, I.B., and S.A. Skotnikov. Unit for the Analysis of Micrograms in Metals and the Analysis of Gas in Small Samples	217
Pilimonov, L.B., and M.M. Kagan. Spectral Analytic Determination of Carbon and Hydrogen in Titanium	222

Card 14/31

BOROVSKIY, I.B.; GUROV, K.P.

Theory of diluted solid solutions. Issl. po zharopr. splav. 3:264-272  
'58. (MIRA 11:11)

(Solutions, Solid) (Crystal lattices)

BOROVSKIY, I.B.; KONAMI, G.N.

Effect of thermal vibrations of atoms on the electron spectrum of  
metals and alloys. Issl. po sharopr. splav. 3:273-278 ' 58.  
(MIRA 11:11)

(Spectrum, Atomic) (Electrons)

BOROVSKIY, I.B.; SKOTNIKOV, S.A.; PETRUSHIN, I.F.

Spectroscopic determination of nitrogen in metals. Trudy Inst.met.  
no.3:276-282 '58. (MIRA 12:3)  
(Nitrogen--Spectra) (Gases in metals) (Spectroscope)

BOROVSKIY, I.B.; SHTEYNBERG, A.H.; BUGULOVA, V.V.

Quantitative determination of Bi, Pb, Zn and Cd in silicon by the sublimation method with preliminary treatment for sensitivity. Trudy.Inst. met. no.3:283-288 '58. (MIRA 12:3)  
(Silicon--Analysis) (Nonferrous metals--Spectra)

AUTHOR: Borovskiy, I. B.

78-3-3-6/47

TITLE: Discussion and Lectures (Obsuzhdeniye dokladov)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958, Vol. 3, Nr 3,  
pp. 601-601 (USSR)

ABSTRACT: Concerning the lectures held at the first plenary meeting the lecturer reports on his experience collected in the use of spectroscopic methods for the construction of phase diagrams in laboratories. During the last years this method was successfully applied in the investigation of the distribution of welding seam elements and of diffuse constants. In this connection the proposal was made to use the method of local analysis by means of the investigation of diffuse layers for the construction of phase diagrams of binary, tertiary and even more complicated systems. This method will turn out to be extremely useful as it will make it possible to obtain a section of the phase diagram as well as to determine the corresponding temperatures and the limits of these phases. The systems copper-zinc and molybdenum-boron were investigated as examples. The method consists of the fact that an electron probe of a diameter of

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from 1-3  $\mu$  is used. The electrons are accelerated by a voltage of up to 50 kW and reach the ground section representing the anode. The intensity of radiation is registered and the amount of the content of the elements is determined according to the curve of concentration. This curve is obtained by the continuous displacement of the model below the electron beam. It was found that in this the radiation intensity of an element starting from calcium to uranium is fixed. The diffusion layer obtained in the burning of two metal pieces pressed at corresponding temperatures is analysed. A thickness of 10  $\mu$  is sufficient. The presence of the one or other compound in this layer can be determined. In the case of artificial standard compositions the composition of each phase can be determined with an exactness of up to 2-4% with a magnitude of from 1-2  $\mu$ . The investigation of the classical diagram copper-zinc by means of the diffusion layer method made it possible to determine the limits of the  $\gamma$ -,  $\epsilon$ -,  $\eta$ -phases which corresponded to those earlier known. The diffusion layer molybdenum-beryllium was investigated as an example of an unknown diagram. The presence of two known phases was proved. Three phases were found. The works are continued. At present it is possible to investigate the phases of a magnitude of one micron, and it is hoped to reach a magnitude of 0.1  $\mu$ . Then it will be

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..Discussion and Lectures

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possible to investigate the grain boundaries.

ASSOCIATION: Institut metallurgii im. A.A. Baykova Akademii nauk SSSR,  
Moskva (Institute for Metallurgy imeni A.A. Baykov, AS USSR,  
Moscow )

Card 3/3

BOROVSKIY, I.B.

66353

SOV/81-59-19-67687

5.5310, 18.8400

Translation from: Referativnyy zhurnal. Khimiya, 1959, Nr 19, p 118 (USSR)

AUTHORS: Borovskiy, I.B., Skotnikov, S.A.

TITLE: An Installation for the Analysis of Nitrogen in Metals and the Analysis of Gas in Small Samples

PERIODICAL: Fiz. sb. L'vovsk. un-t, 1958, Nr 4(9), pp 217 - 222

ABSTRACT: A low-voltage spark from an electron tube generator permitting wide variations of the parameters of the discharge circuit serves as light source for the determination of N in steel at concentrations of 0.0045 - 0.18%. A phase shifter permits to select the phase for the kindling pulses, a waiting multivibrator ensures a large amplitude of the peak at a small amplitude of the output tension. The phase inversion circuit permits to cause kindling by pulses of both signs with a frequency of 100 cycles. Two double conversion cells permit to kindle a spark in every half-cycle as well as in every second, fourth or eighth half-cycle. The pulse passes to a cathode follower and from it to a TG-235 thyatron. The pulse given by the thyatron is transformed to a tension of 20 kv and enters an autotransformer circuit with an

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SOV/81-59-19-67687

An Installation for the Analysis of Nitrogen in Metals and the Analysis of Gas in Small Samples

auxiliary spark gap. The inductance of the discharge circuit can be reduced to  $0.25\mu$  henry at any capacitance, in this case a stable spark-over of the interelectrode gap of 1 mm is ensured. The generator switches on the time relay. The discharge chamber contains the rack for eight samples and the same quantity of Cu-electrodes. The setting of the electrodes and the shifting of the samples can be carried out without disturbing the hermetic seal of the chamber by means of three conic sections. A vacuum system has been developed with metal gas pipes permitting to evacuate the discharge chamber and to fill it with the needed gas with the least inflow of atmospheric air. The spectra are photographed on an ISP-51 spectrograph with a camera of  $F = 270$  mm at a capacitance of  $270\mu$  farad and an inductance of  $5\mu$  henry. Small samples are poured with Wood's alloy to avoid overheating. The slit is illuminated by a sharp image of the light source. The study of the results of the analysis of steels of three different grades warrants an assumption on the presence of the effect of third components on the spectral determination of N.

N. Sventitskiy

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SOV/126-6-1-19/33

AUTHORS: Troneva, N. V., Marchukova, I. D. and Borovskiy, I. B.

TITLE: The L-series X-ray Lines of Ce in  $\text{CeB}_6$  and  $\text{CeO}_2$   
(Rentgenovskiy L-spektry tseriya v  $\text{CeB}_6$  and  $\text{CeO}_2$ )

PERIODICAL: Fizika Metallov i Metallovedeniye, 1958, Vol 6, Nr 1.  
PP 141-147 (USSR)

ABSTRACT: The spectra are studied in emission and absorption using a photographic vacuum spectrograph (not described) at a dispersion of 14.5 kX/mm. The preparation and structure of the materials is discussed in some detail, the electron band structure in these crystals being the ultimate point of interest in the work. Figs. 1-3 show microphotometer traces for some of the lines, or drawings deriving therefrom. (1 and 2 in emission, 3 in absorption, using the continuum from a W anode). Table 1 is concerned with the electron band structures in the compounds, Tables 2-4 with the experimental results. It is concluded that the bonding and valence state have a substantial influence on the L-levels, particularly the upper ones. Ionic bonding broadens the line absorptions (5d and 6s states) and causes a shift in level, relative Card 1/2 to metallic bonding. The shift related to the 4f state

The L-series X-ray Lines of Ce in  $\text{CeB}_6$  and  $\text{CeO}_2$  SOV/126-6-1-19/33

in  $\text{CeB}_6$  indicates an apparent valency of less than 4, in agreement with the data of Ref.(19). It is also concluded that the 5d and 6s states play a considerable part in the bonding, unlike the 4f, as earlier magnetic data indicate.

There are 3 figures, 4 tables and 26 references, 10 of which are Soviet, 7 English, 8 French, 1 German.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni  
M. V. Lomonosova (Moscow State University imeni  
M. V. Lomonosov)

SUBMITTED: November 12, 1956

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1. Cerium boride crystals--X-ray analysis 2. Cerium  
boride crystals--Spectra 3. Cerium oxide crystals--  
X-ray analysis 4. Cerium oxide crystals--Spectra

AUTHOR: Borovskiy, I. B. SOV/30-58-7-11/49

TITLE: Effective Analysis Method of Micro Volumes of Substance  
(Effektivnyy metod analiza mikroob'yemov veshchestva)

PERIODICAL: Vestnik Akademii nauk SSSR, 1958, Nr 7, pp. 64 - 68 (USSR)

ABSTRACT: Alloys of complicated compositions are used in modern engineering: refractory, super-hard and special alloys for construction which sometimes contain up to 20 elements. Complicated alloys are heterogeneous as a rule: their individual cores exhibit a different chemical composition and crystalline structure. The linear dimensions of the heterogeneous phase domains are within the limits of from  $10^{-6}$  to  $10^{-2}$  cm. Special methods of investigation are required for obtaining a complete characteristic of the chemical composition and the structure of such domains. In 1951, in France A.Gin'ye, R. Kosten, and independent of these authors, the author of this article proposed the method of X-ray analysis of the composition in micro volumes of substances. The essential feature of this method is given in figure 1, which is described. The instrument RSASH -2 (Fig 2) was developed at

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Effective Analysis Method of Micro Volumes of  
Substance

SOV/30-58-7-11/49

the Institute of Metallurgy imeni A.A.Baykov, AS USSR (Institut metallurgii im.A.A.Baykova Akademii nauk SSSR). A high local sensitiveness of the new method, the possibility of selection and fixation of the analyzed micro volume and the automatic plotting of the concentration curves make it possible to solve a great number of problems in the most different fields of science and engineering. At present, the development of the equipment RSASH-3D which is to be used for analyzing the elements up to magnesium inclusively, is completed. The most common and most simple method is that of analyzing the composition in the individual points of a cross-section. The recording of the results obtained by such an analysis is explained by figure 3. Furthermore, the results obtained by the investigation of an iron-nickel-meteorite are explained (Figs 4,5). The existing apparatus and method developed in the USSR make it possible to solve already now many scientific and technical problems in the field of physics of solids, of metallurgy, of astrophysics and of foundry technique, of mineralogy and paleontology which cannot be solved by other

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Effective Analysis Method of Micro Volumes of  
Substance

SOV/30-58-7-11/49

methods of physicochemical analysis. There are 5 figures.

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*Borovskiy, I. B.*

20-2-20/60

**AUTHORS:** Borovskiy, I. B. , Gurov, K. P. , Miller, Yu. G.

**TITLE:** The Influence of Chromium, Molybdenum, and Tungsten on the Autodiffusion of Iron in  $\alpha$ -Solid Diluted Solutions  
(Vliyaniya khroma, molibdena i vol'frama na samodiffuziyu zheleza v razbavlennykh  $\alpha$ -tverdykh rastvorakh)

**PERIODICAL:** Doklady AN SSSR, 1958, Vol. 118, Nr 2, pp. 280 - 283 (USSR)

**ABSTRACT:** Based on their investigation (reference 1) of the energy spectrum diluted solid solutions and based also on the analysis of data by other authors (reference 2) the authors developed model-impressions about the special character of the electron spectrum of such systems and about the existence of additional local forces of the bindings. These investigations referred to the case that a transition-metal, the atoms of which have "defective" (n-1)d- and (n-1)f-electron shells, is used as the base of the diluted solid solution. To study the influence of Cr, Mo and W on the autodiffusion of iron, for each system 6 alloys with a percentage of  $\sim 0,1$  to 4

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The Influence of Chromium, Molybdenum, and Tungsten on the Autodiffusion of Iron in  $\alpha$ -Solid Diluted Solutions

atom-percent of the second component were produced. The base for producing these alloys was a specially purified electrolytic iron. From these alloys plane parallel test-pieces, which had a diameter of 15 mm and were 6 mm thick, were turned out. Then a thin layer of radioactive  $\text{Fe}^{59}$  was laid on these test-pieces by electrolytic way. The coefficients of autodiffusion of iron in the alloys were ascertained by one of the methods of the plane parallel distance of layers. The diagrams illustrate the curves of the dependence of the coefficients for autodiffusion of iron on the rate of concentration of Cr, Mo and W. In all the three cases the coefficient of autodiffusion initially decreases, then passes a minimum in the case of concentrations of an order of  $\sim 0,1$  atom-per cent, afterwards increases, reaches a maximum at concentrations of  $\sim 1$  atom-per cent and then changes only insignificantly. There is an optimum concentration of admixture, in the case of which the regulating effect of the ingots is a maximum, and a superior limit of concentrations, where ingots can exist. If the concentration of the admixture increases, the number of ingots increases, too, and the

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The Influence of Chromium, Molybdenum, and Tungsten on the Autodiffusion of Iron in  $\alpha$ -Solid Diluted Solutions

coefficient of autodiffusion decreases according to this. At that concentration of the admixture, which corresponds with the "tight packing" of the ingots, the coefficient of autodiffusion is a minimum. The model-impressions, which are discussed here, have been worked out for the absolute temperature of zero and for an ideal structure of a crystal. The factor of temperature distorts the phenomenon, but according to the results, which were shown here, the curve of the coefficient of autodiffusion agrees with the expected curve. The effects of autodiffusion at the boundaries of the grains distort the curves of concentration, which were obtained, only insignificantly. There are 3 figures, and 8 references, 4 of which are Slavic.

ASSOCIATION:

PRESENTED:

SUBMITTED:

AVAILABLE:

Card 3/3

Institute for Metallurgy imeni A. A. Baykov AN USSR (Institut po metallurgii im. A. A. Baykova Akademii nauk SSSR)  
August 7, 1957, by G. V. Kurdyumov, Academician  
July 19, 1957  
Library of Congress

3(1), 18(3)  
AUTHORS:

Yavnel', A. A., ~~Borovskiy, I. B.~~,  
Il'in, N. P., Marchukova, I. D.

SOV/20-123-2-12/50

TITLE:

The Investigation of the Composition of the Phases of Meteoritic Iron by the Method of the Local X-Ray Spectrum Analysis  
(Izucheniye sostava faz meteoritnogo zheleza metodom lokal'nogo rentgenospektral'nogo analiza)

PERIODICAL:

Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 2, pp 256-258 (USSR)

ABSTRACT:

A short report is first given on earlier papers dealing with this subject and on the shortcomings of hitherto employed methods. The authors investigated the phase composition by the method of the X-ray spectrum analysis of the microvolumina. This method was developed a short time ago by I. B. Borovskiy. The object of investigation was the iron meteorite Chebankol found in 1938, which, according to analyses carried out by M. I. Dyakonova, contains 9.03 % Ni and 0.44 % Co. The continuous distribution of iron, nickel, and cobalt with recording of the concentration curves during passage through the "bars" of the  $\alpha$ -phase and through the strips of the  $\gamma$ -phase was investigated. The authors determined the composition of the

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The Investigation of the Composition of the Phases of Meteoritic Iron by the Method of the Local X-Ray Spectrum Analysis SOV/20-123-2-12/50

phases by which a Widmannstätten (Vidmanshtet) structure is formed. In the case of a fine-grained phase mixture the average composition was determined. A diagram shows the typical result obtained by the first measuring series. A conspicuous feature is the distinctly marked boundary between the phases in form of a "jump" of the content of all important components of the alloy. All measurements distinctly showed an increase of the nickel content and a decrease of the iron and cobalt content extending from the center of the strip of the  $\mu$ -phase in the direction towards its edge, in which case the extremum value is on the boundary itself. According to the above-mentioned data the crystal was no longer heated after crystallization to such an extent as might cause a change of the composition and ratio of the phases on the boundary by which they are divided (even if the entire system did not regain full equilibrium). Both phases of the meteoritic iron are of inhomogeneous composition in spite of exceedingly slow cooling down, i.e. the system is not fully in equilibrium. The temperatures corresponding to the results obtained differ among one another by about 20 °. Causes that might possibly be

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The Investigation of the Composition of the Phases SOV/20-123-2-12/50  
of Meteoritic Iron by the Method of the Local X-Ray Spectrum Analysis

responsible for this non-agreement are mentioned. The data obtained for the variation of nickel concentration might indicate a decrease of the solubility limit of nickel in the  $\alpha$ -phase with an increase of the degree of cooling, beginning from a certain temperature value. Also the measurements carried out of the phase composition of such parts of the plessite in which the strips of the  $\gamma$ -phase are subdivided by narrow strips of the  $\alpha$ -phase showed a similar distribution of elements. There are 3 figures, 1 table, and 8 references, 1 of which is Soviet.

ASSOCIATION: Komitet po meteoritam Akademii nauk SSSR (Committee for Meteorites of the Academy of Sciences, USSR)  
Institut metallurgii im. A. A. Baykova Akademii nauk SSSR  
(Institute for Metallurgy imeni A. A. Baykov of the Academy of Sciences, USSR)

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5(4),24(2),18(6)

SOV/20-123-3-30/54

AUTHORS: Valoukh, M., Borovskiy, I. B.

TITLE: ~~The Distribution of an Impurity~~ in a Single Crystal of Metallic Zinc of Honeycomb Substructure (Raspredeleniye primesi v monokristalle metallichesкого tsinka s sotovoy substrukturoy)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 3, pp 490-491 (USSR)

ABSTRACT: The authors first discuss in short some previous papers on this subject. The present paper investigates the distribution of an impurity (copper) over the elements of the substructure of a zinc single crystal. This single crystal with an impurity content of 0.7% copper was bred according to the method of Chokral'skiy. The amount of the impurities of the other elements was less than 0.01%. The cylindrical single crystal was polished perpendicularly to its axis. The fibrous honeycomb structure was detected after chemical polishing. The distribution of copper over the substructure elements of the zinc single crystal was investigated by the X-ray-spectral method for the investigation of the chemical composition in the microvolumina of alloys by means of the apparatus RSASh-2. A figure shows the concentration curves for

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The Distribution of an Impurity in a Single Crystal  
of Metallic Zinc of Honeycomb Substructure

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the distribution of copper over the substructure elements. The diagram shows a sharp increase of the copper content from the boundary to the center of the fiber (honeycomb). According to the results of a quantitative analysis, the copper content amounts to 0.7% in the center and to 0.4% on the boundary. The results of this paper convincingly confirm the general theory that an admixture which raises the melting point of the metal is concentrated in the center of the substructure cells and that the X-ray spectral method of investigating the chemical composition of matter in a microvolume can be used for the investigation of this interesting phenomenon. The authors thank L. Ye. Loseva, who investigated the distribution of copper by means of the apparatus RSASH-2, and also M. Bočák and P. Kratochvíl who prepared the zinc single crystals. There are 2 figures and 4 references, 2 of which are Soviet.

ASSOCIATION: Prazhskiy universitet (Prague University) Kafedra fiziki metallov  
(Chair for the Physics of Metals), Institut metallurgii im.  
A. A. Baykova Akademii nauk SSSR (Institute for Metallurgy imeni  
A. A. Baykov of the Academy of Sciences, USSR)  
PRESENTED: July 10, 1958, by I. P. Bardin, Academician  
SUBMITTED: July 7, 1958  
Card 2/2

BOROVSKIY, I.V.

Borovskiy, I.B., and S.A. Skotnikov (Institute of Metallurgy, Academy of Sciences USSR). Apparatus and Methods of Spectral Determination of Hydrogen in Titanium, p. 165. Titan i yego slavy. vyp. II: Metallurgiya titana (Titanium and Its Alloys. No. 2: Metallurgy of Titanium) Moscow, Izd-vo AN SSSR, 1959. 179 p.

This collection of papers deals with sources of titanium; production of titanium dioxide, metallic titanium, and titanium sheet; slag composition; determination of titanium content in slags; and other related matters. The sources of titanium discussed are the complex sillimanite ores of the Kyakhtinskoye Deposit (Buryatskaya ASSR) and certain aluminum ores of Eastern Siberia. One paper explains the advantages of using ilmenite titanium slags for the production of titanium dioxide by the sulfuric acid method. Production of metallic titanium by thermal reduction processes (hydrogen, magnesium, and carbon reduction) is the subject of several papers, while other papers are concerned with the electrolytic production of titanium. Other subjects dealt with are interaction of titanium with water vapor and with hydrogen and the determination of titanium in slags.

BOROVSKIY, I. B.

p. 6.

PHASE I BOOK EXPLOITATION

SOV/3818

Postoyanny mezhinstitutskiy kollokvium po tverdym fazam peremennogo sostava

Kachestvo materialov dlya poluprovodnikovoy tekhniki (Quality of Materials for Semiconductor Technology) Moscow, Metallurgizdat, 1959. 192 p. (Series: Its: Trudy, 1957-1958, vyp. 8-30) 3,600 copies printed.

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Quality of Materials for Semiconductor Technology

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Research Institute, G.Ya. Tarasov, Scientific Research Institute, Committee on Radioelectronics, Yu.V. Yakovlev, (Resp. Secretary of the Board) Institute of Geochemistry, Academy of Sciences USSR.

**PURPOSE:** This book is intended for technical personnel engaged in the manufacture and utilization of semiconductors.

**COVERAGE:** This book treats methods of obtaining quality semiconductor materials and presents current standardized specifications for semiconductors and auxiliary materials. The book is divided into three parts. Part I consists of 16 reports delivered at two conferences in January 1957 and December 1958 at the Fiziko-khimicheskiy institut imeni L.Ya. Karpova (Institute of Physics and Chemistry imeni L.Ya. Karpov) by members of 36 participating institutes and industrial plants. The reports deal with the standardization of characteristics of pure semiconductor materials and describe spectral and spectrochemical analysis, and chemical, vacuum-fusion, polarographic, and radioactivation methods for studying semiconductor materials and determining impurities in them, along with the equipment used. Part II and III include specifications approved at the second conference. The following organizations participated in the work of preparing the specifications: Institute imeni L.Ya. Karpov, GEOKhI, IREA, NII of the Committee on Radio Electronics, Vsesoyuznyy alyuminevo-magniyevyy institut (All-Union Aluminum and Magnesium Institute), Vsesoyuznyy institut aviatsionnykh

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materialov (All-Union Institute of Aviation Materials), IMET AN SSSR, Gipronikel', Gintsvetmet, MGU, Technical Administration of the former Ministry of Nonferrous Metallurgy, Giredmet, Shchekovskiy Chemical Plant of MKhP, NIUIF, OKB, GIGKhS, FTI, NII MRTP, Stalin Plant of Chemical Agents, Sverdlovskiy Plant of Chemical Agents, "Krasnyy khimik" Plant, VAMI, Giprotsvetmetobrabotka, Kudinovskiy Plant of Elektrougol', Elektrougol'nyy nauchno-issledovatel'skiy institut (Electrode-Carbon Scientific Research Institute) of Gosplan USSR, and Nauchno-issledovatel'skiy institut kislorodnovo mashinostroyeniya (Scientific Research Institute of Oxygen Equipment). No personalities are mentioned. References accompany 15 of the reports in Part I.

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Academiya nauk SSSR. Institut metallurgii. Nauchnyy sovet po probleme zharoprochnykh splavov. IV (Studies on Heat-Resistant Alloys, vol. 4), Moscow, Izd-vo AN SSSR, 1959. 400 p. Issledovaniya po zharoprochnym splavam, t. IV (Studies on Heat-Resistant Alloys, vol. 4), Moscow, Izd-vo AN SSSR, 1959. 400 p. Errata slip inserted. 2,200 copies printed.

Ed. of Publishing House: V. A. Kilmov; Tech. Ed.: A. P. Guseva; Editorial Board: I. P. Bardin, Academician; G. V. Kurdymov, of Academiya Nauk SSSR; Corresponding Member, USSR Academy of Sciences; I. A. Odintsov; I. M. Pavlov, and I. P. Zudin, Candidate of Technical Sciences.

PURPOSE: This book is intended for metallurgists concerned with the structural metallurgy of alloys.

COVERAGE: This is a collection of specialized studies of various problems in the structural metallurgy of heat-resistant alloys. Some are concerned with theoretical principles, some with descriptions of new equipment and methods, others with properties of specific materials. Various phenomena occurring under specified conditions are studied and reported on. For details, see Table of Contents. The articles are accompanied by a number of references, both Soviet and non-Soviet.

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BOROVSKIY, Igor' Borisovich

"Some Characteristic Features of Electron Structure of  
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a report presented at Symposium of the International Union of  
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BOROVSKIY, I.B.

"Several Results of the Application of X-Ray Spectral Analyses to the Investigation of Micro-Volumes of Metallic Systems,"

A paper presented at Second International Symposium on X-Ray Microscopy and X-Ray Microanalysis Stockholm 13-18 Jun '59/Soviet Interest in New Techniques for Measuring Density Ultra Soft X-Rays in Outer Space.

SO: B 1,136,088

31 Jul '59

BOROVSKIY, I.B.; DEYEV, A.N.; MARCHUKOVA, I.D.

Using the X-ray spectrum method for local analysis of  
platinum minerals. Geol.rud.mestorozh. no.6:68-73  
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1. Institut metallurgii AN SSSR, Moskva.  
(Platinum minerals—Spectra)